CHARGE NUMBER: Project 1708

PROJECT TITLE: Physical and Chemical Properties of Tobacco

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PROJECT LEADER: B. C. LaRoy

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PARTITIONING OF WATER IN STEM AND LAMINA[1,2] (J. Crump, L. Trentham)

A study of the kinetics of water sorption by "factory stem", "factory lamina", whole leaf, "test stem" and "test lamina" is in progress. Factory stem and lamina designate material separated by the Richmond Stemmery. Test stem and lamina designate material obtained from the Stemmery as whole leaf, reordered as whole leaf then hand separated for analysis. Initial results on Burley grade B57 give adsorption relaxation times for each sample as follows:

Factory Stem	4.9 hrs
Factory Lamina	4.0 hrs
Whole Leaf	6.7 hrs
Test Stems	9.9 hrs
Test Lamina	6.0 hrs

Sorption rates for factory separated stem and lamina are essentially the same and are faster than for whole leaf. The slower rate of sorption for stem compared with lamina when they are part of a whole leaf could prove useful during Stemmery threshing. If the same is true for desorption, it may be possible (as suggested by J. Whidby) to overwet leaf and then rapidly dry it back to the normal OV (approximately 18%) just prior to threshing, leaving stems more moist than the lamina, and thus more flexible for threshing. Desorption studies are in progress.

TRACKING METHODS FOR TOBACCO ACCOUNTABILITY[1,3,4] (M. Wood, J. Crump, H. Hartung)

For tobacco accounting purposes, it is desirable to track the mass flow of tobacco independently of water and casings. Two current methods for tracking tobacco "dry weight" are OV and GC water. The former method is substrate dependent, while the latter is more time consuming and has more measurement-to-measurement variability. It has been suggested that tracking an "inorganic" component (Ca, Mg or K) might provide a better means of accounting for tobacco loss or gain than either moisture measurement method. Thus, a cooperative program with QA and the Analytical Division was initiated for quantitative comparison of these approaches. The program includes comparisons of OV, GC water and inorganic analyses on dried tobacco to which measured amounts of water and casings have been added. Initial experiments are in progress.

FILLER LENGTH EFFECTS ON BULK MODULUS[5] (B. LaRoy, L. Trentham)

Following extensive repairs to the Instron machine, previous data were rechecked for accuracy. As before, DBC bright filler compressed to 0.16 g/cc could accept the admixture of 20% by weight of ground bright filler "dust" with no alteration in the pressure required for compression. For the same filler compresed to 0.2 and 0.25 g/cc, the addition of 20% dust increased pressure by approximately 20% and 25%, respectively. Work in this area is continuing with current emphasis on eliminating instrumental effects from data at densities above 0.3 g/cc.

TOBACCO BREAKAGE MECHANISMS[6] (T. W. Haas)

Initial review of the literature has identified only one friability test for tobacco. This consists of simply chopping the tobacco shreds in the Waring Blender. However, the Kramer shear press which is used to measure the "texture" of vegetables may be of interest since it operates in a testing machine which allows quantitative measurements of forces and energies. The data obtained might compliment results currently being developed by Project 0307 with the Hobart food cutter.

Preliminary experiments with rectangular samples cut from cured leaf and tested in tension in the MTS machine indicate that edge effects may be a problem since all failures initiated at the side of the specimen midway between the grips. However, additional testing will be required before any definite conclusions can be reached.

VIBRATION TESTING[7] (D. Full)

Initial investigations are in progress to examine the acoustic emissions of cigarettes subjected to sinusoidal vibration. Preliminary results suggest that such emissions are indicative of rod defects and that defect location may be determined acoustically.

RL STIFFNESS[8] (L. Trentham)

Stress-relaxation measurements of RL samples have been completed. Measurements of RL samples cut with the grain of the sheet and transverse to the grain of the sheet have been made. Similar measurements of RL sheet coated with class tobacco, and cut with similar orientation to the grain of the sheet, have been completed. Anallysis of the data is under way.

COMPUTER MODELING[4] (H. Hartung)

Programs for training laboratory personnel in the use of APL Cigarette Modeling capabilities were initiated jointly with the Computer Applications Division. On-line, interactive tutorials proved very successful in preliminary trials, and they turned out to be quite

easy to implement. We plan to pursue this approach because it offers users the opportunity to apply cigarette modeling results in their work without necessarily investing large blocks of time and effort in computer training.

REFERENCES

1. J. C. Crump, Notebook #7220, pp. 178-82.
2. L. M. Trentham, Notebook #7885, pp. 2-8.
3. M. J. Wood, Notebook #7653, pp. 36-37.
4. H. A. Hartung, Notebook #7805, pp. 25-30.
5. B. C. LaRoy, Notebook #7838, pp. 86-90.
6. T. W. Haas, Notebook #7676, pp. 70-72.
7. D. A. Full, Notebook #7199, p. 198.
8. L. M. Trentham, Notebook #7885, pp. 12-26.

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